

WHAT IS CLAIMED IS:

1. A demodulation apparatus for demodulating modulated signals, the apparatus comprising:

5 a digital signal generator for performing synchronous detection of a modulated input signal and for making an A/D conversion to generate digital signals corresponding to phase axes;

10 a frequency correction value outputting unit for outputting a frequency correction value set on the basis of a symbol rate;

a frequency corrector for giving a frequency offset to the digital signals on the basis of the frequency correction value to generate frequency-corrected signals;

15 a timing recovering unit for performing timing recovery by extracting symbol timing for the frequency-corrected signals;

a C/N detector for detecting C/N from a symbol obtained by the timing recovering unit;

20 an optimum frequency correction value determining unit for treating a frequency correction value corresponding to the maximum value of the C/N as an optimum frequency correction value;

25 a carrier recovering unit for performing carrier recovery by correcting finally a shift in the frequency of a signal on which a frequency correction by the use of the optimum frequency correction value and timing recovery have been made; and

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a synchronization detector for making an error correction on a symbol after carrier recovery and for detecting a unique word.

5 2. The demodulation apparatus according to claim 1, wherein the C/N detector detects C/N, in the case of performing carrier pull-in control, from a symbol which depends on the shift in frequency, and detects C/N, after carrier pull-in, from a symbol which does not depend on the
10 shift in frequency.

 3. The demodulation apparatus according to claim 1, wherein the C/N detector detects the C/N on the basis of dispersion in the direction of symbol amplitude.

15 4. The demodulation apparatus according to claim 1, wherein the frequency correction value outputting unit updates a frequency correction value by a frequency value being smaller than the pull-in range of the carrier
20 recovering unit.

 5. The demodulation apparatus according to claim 1, wherein the frequency correction value outputting unit updates a frequency correction value by a frequency value
25 being greater than the pull-in range of the carrier recovering unit.

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6. The demodulation apparatus according to claim 5,
further comprising a shift detector for detecting the shift
between a signal on which a frequency correction by the use
of an optimum frequency correction value determined on the
5 basis of the frequency correction value greater than pull-in
range and timing recovery have been made and the pull-in
range of the carrier recovering unit.

7. The demodulation apparatus according to claim 1,
10 wherein the frequency correction value outputting unit
outputs a frequency correction value being greater than the
pull-in range of the carrier recovering unit before
determination of the optimum frequency correction value and
outputs, on the basis of a synchronization detection signal,
15 a frequency correction value being smaller than the pull-in
range after determination of the optimum frequency correction
value.

8. A broadcasting system for communicating digital
20 satellite broadcasts, the system comprising:

a broadcast sending apparatus including:

a modulator for modulating a signal to be sent
to generate a modulated signal,

an up converter for converting the modulated
25 signal to a radio signal, and

a sending unit for sending the radio signal to a
satellite via an antenna; and

a broadcast receiving apparatus including:

a receiving unit for receiving a signal sent from the satellite to the ground,

a down converter for converting the frequency of
5 a signal received to generate a signal to be demodulated,

a digital signal generator for performing synchronous detection of a signal output from the down converter which was modulated on the sending side and for making an A/D conversion to generate digital signals
10 corresponding to phase axes,

a frequency correction value outputting unit for outputting a frequency correction value set on the basis of a symbol rate,

a frequency corrector for giving a frequency
15 offset to the digital signals on the basis of the frequency correction value to generate frequency-corrected signals,

a timing recovering unit for performing timing recovery by extracting symbol timing for the frequency-corrected signals,

20 a C/N detector for detecting C/N from a symbol obtained by the timing recovering unit,

an optimum frequency correction value determining unit for treating a frequency correction value corresponding to the maximum value of the C/N as an optimum
25 frequency correction value,

a carrier recovering unit for performing carrier recovery by correcting finally a shift in the frequency of a

signal on which a frequency correction by the use of the optimum frequency correction value and timing recovery have been made, and

5 a synchronization detector for making an error correction on a symbol after carrier recovery and for detecting a unique word.

9. A broadcast receiving apparatus for demodulating modulated signals for a digital satellite broadcast, the
10 apparatus comprising:

a receiving unit for receiving a signal sent from a satellite to the ground;

a down converter for converting the frequency of a signal received to generate a signal to be demodulated;

15 a digital signal generator for performing synchronous detection of a signal output from the down converter which was modulated on the sending side and for making an A/D conversion to generate digital signals corresponding to phase axes;

20 a frequency correction value outputting unit for outputting a frequency correction value set on the basis of a symbol rate;

a frequency corrector for giving a frequency offset to the digital signals on the basis of the frequency
25 correction value to generate frequency-corrected signals;

a timing recovering unit for performing timing recovery by extracting symbol timing for the frequency-

corrected signals;

a C/N detector for detecting C/N from a symbol obtained by the timing recovering unit;

an optimum frequency correction value determining
5 unit for treating a frequency correction value corresponding to the maximum value of the C/N as an optimum frequency correction value;

a carrier recovering unit for performing carrier recovery by correcting finally a shift in the frequency of a
10 signal on which a frequency correction by the use of the optimum frequency correction value and timing recovery have been made; and

a synchronization detector for making an error correction on a symbol after carrier recovery and for
15 detecting a unique word.